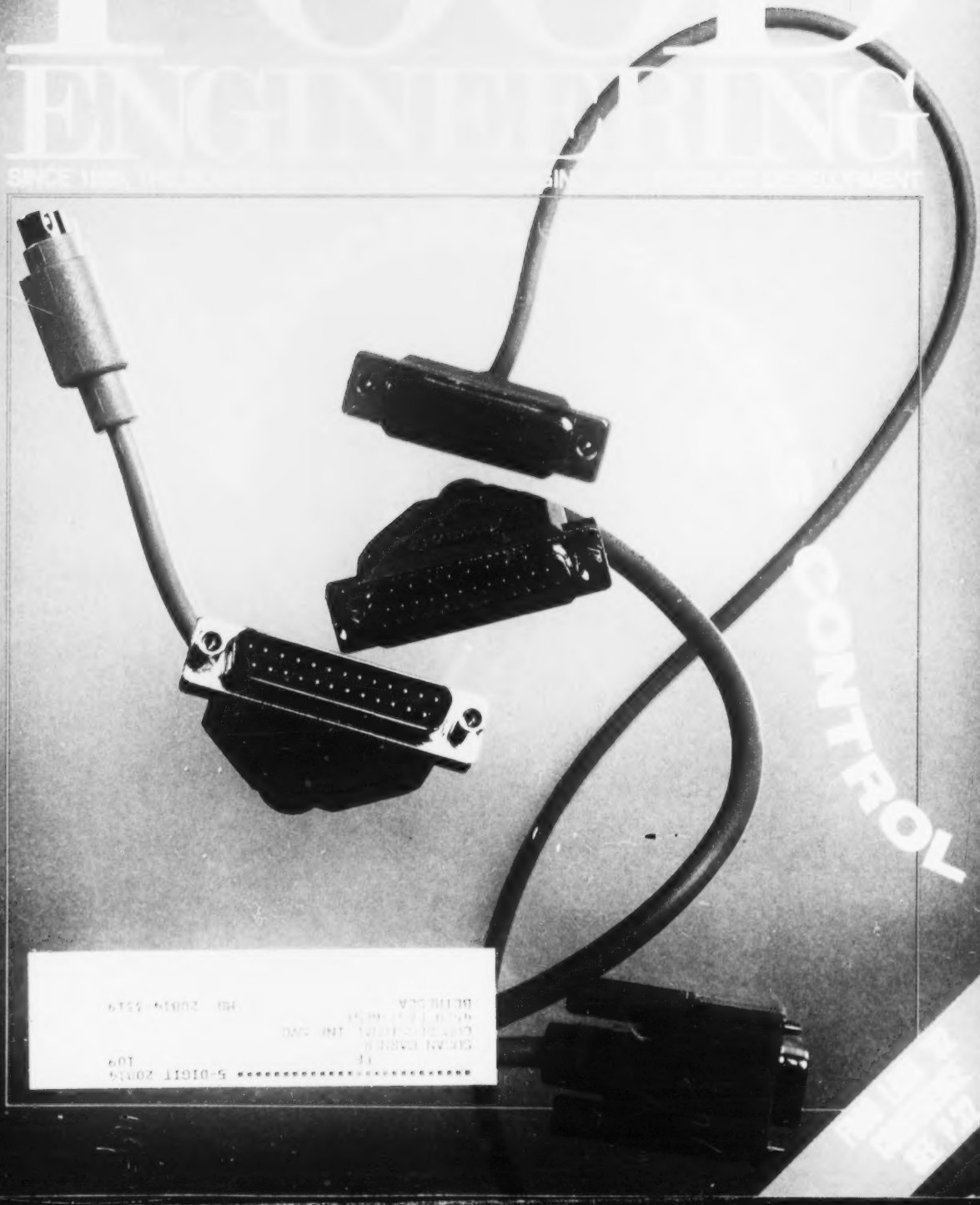
CHILTON'S

FEBRUARY 1982

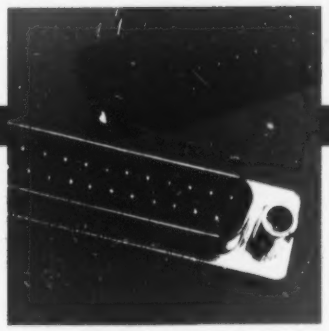
FOOD ENGINEERING

SPACE AGE TECHNOLOGY FOR FOOD PROCESSING EQUIPMENT



CONTROL

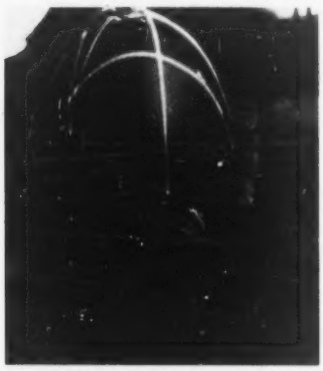
FOOD ENGINEERING



ABOUT THE COVER

Integration of food processing operations continues its fitful advance. Companies with islands of automation often are hesitant about committing to more advanced integration—with good reason.

PAGES 84 TO 90



SPECIAL EMPHASIS

PAGES 101 TO 103

JUICES: **PAGE 25**

ENGINEERED FOODS

25 **Business Is Blooming for Botanicals**
Although used since ancient times to flavor foods, the food industry has recently rediscovered botanicals.

26 **Mousses Are Lighter but Flavorful**
Battelle Europe has discovered an alternative to fat replacers when making foods "lighter."

26 **Marketplace—Does Non-fat Reduce Fat?**
Critics are questioning whether low- and non-fat foods will greatly slow the national trend toward obesity.

31 **Software Can Substitute Ingredients**
New software can clarify market potential by characterizing food consumption profiles, analyzing nutrient intake and providing nutrient profiles.

36 **'Meat and Potatoes' in One Product**
VEBE offers two types of modified potato starches for processed meat and poultry applications.

PROCESSING & CONTROL

53 **New Technology Yields Low-fat Meat**
Beef Products Inc. (BPI) has developed a new process for separating lean from fat in fresh beef trimmings.

54 **Mill Reduces Peanuts in Single Pass**
Algood Food Co. eliminated three production steps by streamlining milling with a single-pass mill.

56 **Software Does More Than Retort Control**
Retort-control software has three modules which address: day-to-day production, supervisory data acquisition, and product development and testing.

60 Online—Beware of Quality!
When quality becomes equated with bells and whistles, it's time for a firm to re-examine purchasing policies.

FOOD PACKAGING

68 Lifecycle Assessment Clarified
Lifecycle assessment offers a method of determining the environmental advantages of one product over another.

70 Innovative Water Bottle Stands Out
Pocono Artesian Waters Co. is positioning itself in the bottled water market with new PET polyester packaging.

72 Metal Detectors Offer New Technology
The new detectors use digital "sample and hold" technology, which represents a major advancement over conventional analog "auto balancing" methods.

77 Online—Seen Many New Packages?
It's easier to replace an incumbent Congressman than it is to try a new packaging concept.

FEATURES

84 The Integration Issue
Open architectures, industry standards and vendor partnerships are lowering the cost of integration.

93 Preparing the Workforce for Tomorrow
Workers are no longer being asked to leave their brain at the door. Automation and a new mindset have arrived to demand a better educated worker.

101 Formulating with Friendly Fats
They're functional. They're flavorful. And with a nod toward healthier eating, they're "consumer-friendly."

DEPARTMENTS

11 Editorial
12 Calendar
15 Industry Report
105 New Products
112 New In Print
113 People
140 The Final Analysis

JESSE H. NEAL AWARD-WINNING EDITORS

CHILTON FOOD GROUP

Catalog and Food Engineering International
Co-sponsor of Food Plants '92
Co-sponsor of Food Labs '92

Permission to photocopy for internal use or the internal use of specific clients is granted by Chilton Company for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $1.00 per copy of the article, plus 25¢ per page is paid directly to the CCC, 27 Congress St., Salem, MA 01970. Special requests should be addressed to The Editor. (0193-323X/85 $1.00 + 25¢)

FOOD ENGINEERING® (ISSN 0193-323X) February 1992, Vol. 64, No. 2. Published monthly by Chilton Company, One Chilton Way, Radnor, PA 19089 (Telephone 215/964-4000). Chilton Co., one of the ABC Publishing Companies, a part of Capital Cities/ABC Inc., New York, NY. Second Class Postage Paid at Wayne, PA 19087 and additional mailing offices. Title registered in U.S. Patent Office

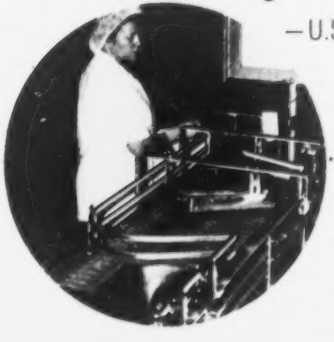
*Chilton Company, 1992. All rights reserved.

POSTMASTER: Send form 3579 to Food Engineering, Post Office Box Number 2035, Radnor, PA 19089.

PREPARING THE WORKFORCE FOR TOMORROW ...OR PERHAPS THIS AFTERNOON

"The world has changed. A strong back, the willingness to work and a high school diploma were once all that was needed to make a start in America. They are no longer. A well-developed mind, a passion to learn and the ability to put knowledge to work are the new keys to the future of our young people, the success of our businesses and the economic well being of the nation."

—U.S. Department of Labor report



PATRICIA M. DILLON
SENIOR ASSOCIATE EDITOR

Workers are no longer being asked to leave their brain at the door and simply do what the boss says. Automation and a new mindset have arrived to demand a better educated worker who takes an active interest in how the job gets done.

Automation brings with it computerized equipment that needs to be operated by people who have the basic math skills to learn statistical process control. And this equipment must be maintained by specialists trained in electronics.

At the same time, workers are being asked to make decisions formerly made by somebody who used to look over their shoulders. While some companies are giving line workers more authority because of mid-management layoffs, other companies discovered years ago that an empowered workforce is far more quality conscious than a zombie workforce. These companies acknowledge that workers know their jobs better than anyone and their expertise is valued to make the manufacturing process as efficient as possible. In fact, companies that continue to operate under

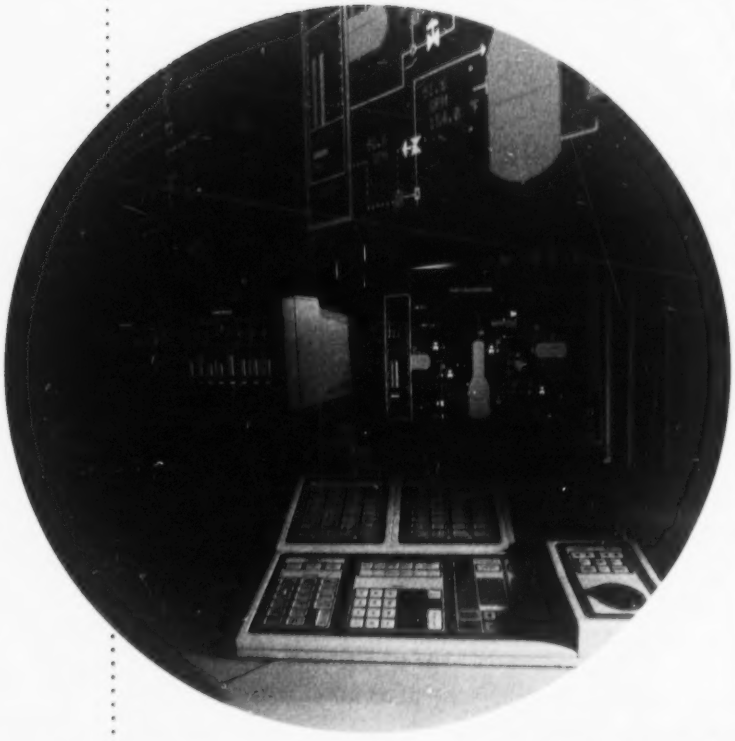
Close attention to training and employee involvement have maintained high efficiency and morale at Campbell Soup Co.'s Maxton, NC plant.

FUTURE FOOD WORKERS

the traditional assumption that workers are brainless will be out of business, according to several managers interviewed by *FE*.

Leading edge companies are setting standards that will be followed over the next ten years. In a nutshell, workers must be "highly skilled, flexible, and ready to solve problems through greater access to information," said Jim McConnaughay, vice president of operations and human resources at Golden Grain, San Leandro, CA, a subsidiary of Quaker Oats, Co.

"Over the next ten years, we will be looking more and more for people who have shown the ability to learn, because they are the employees who will be able to adapt to the changes in the workplace. Those who have shown the ability to adjust from manually stacking cases on a pallet to managing the needs of their equipment are the ones who are succeeding," said Michelle Beale, senior vice president, human resources and public affairs at Coca-Cola Foods in Houston, TX. Even forklift operators at Coke have grown from simply transporting goods to identifying the product, entering records into the inventory computer and defining its location in the storage system.



Manufacturing is becoming increasingly automated and employees must be technically-proficient to run the equipment. (Source: Rosemount, Inc.)

The beverage industry changes rapidly to meet consumer demand, said Beale. This exerts pressure on employees to be able to learn something new "tomorrow or even this afternoon," she added. "If today, employees have to operate a computer by making selections from a menu, tomorrow they may have to program the machine."

In the future, workers will be adapting to physically different plants. Plants will be "brighter, cleaner, highly-automated operations which will be smaller in size yet have the same capacity of many of today's plants that were built in the days following World War II," said Mike Broll, vice president of operations for desserts and specialty products at Pillsbury's Murphysboro, TN plant.

Beverage processing plants, which are highly automated, can expect to "require less manual care. Surfaces will be more resistant to soil, equipment will be easier to sanitize and the flow of production will more closely represent a straight line. Electronics will play a big role in the process and there will be a concomitant need for skilled technicians to maintain it," said Beale.

Workers who will successfully fit into modernized plants must upgrade their technical proficiency. Line workers need the basic math skills to learn statistical process control. Maintenance crews need better electronic skills in addition to basic mechanical skills. Workers will be expected to be multi-skilled to run different pieces of equipment, said Pillsbury's Mike Broll. "And On-the-Job training isn't enough to train people," he added. Many managers interviewed by *FE* said they seek vocational school or community college graduates. Many

Educating your present and future workforce

Progressive companies educate both their present workforce and look to the future by taking an active interest in the school system, since its students will eventually apply for work at the plant.

But first, a look at one aspect of Campbell Soup Co.'s training at its Maxton, NC plant. Loretta Hoeffner, manager of training, and Donna Norris, training coordinator at Maxton, interview the more experienced operators to develop a binder full of procedures for doing the job right. It includes nuances that only years of experience reveal and excludes the obscure garble that often litters suppliers' user manuals. Once completed, the operators review the trainer manuals for accuracy.

Interviewing operators also helps identify the best candidates to become trainers. "Sometimes, the most experienced or technical people are not the best teachers," said Hoeffner. "Employees see becoming a trainer as a form of recognition and an opportunity to help others and grow professionally," she added.

Training new hires in a noisy production environment is difficult, especially when both parties wear earplugs. As Hoeffner said, often people nod in agreement even when they haven't heard what was said. To counteract that, trainers and trainees spend a limited amount of time on the production floor, then return to a quiet classroom to review key points.

Having the manual and a method of training relieves some of the stress some trainers feel trying to teach their fellow employees and it also bolsters their confidence.

Training yields extra dividends. Both Hoeffner and Norris said the packaging area was stressful because any delay represents the possibility of losing 80,000 cans of soup. Training provides a relaxed atmosphere for employees to focus on what they need to learn.

Hoeffner and Norris have completed compiling information for the labeling training manual and now are working on filling and cooking. They will go through the plant, and once finished, start the process all over again to update the manuals as new equipment and procedures are added.

What was the hourly employees' reaction to this new vigorous program? "People wished we had done this kind of training sooner," said Norris.

The manuals also serve as the foundation for job descriptions so employees know what is expected of them and management has a better appreciation of what they do.

Campbell's scope goes beyond its own walls. Traditionally, in the rural South, education has been secondary to the demands of agricultural work. However, in Scotland County (pop. 23,073), Campbell Soup, along with nearby Eaton Co. and Abbott Labs, has taken a very proactive approach to improving local schools and their students who eventually apply for jobs at the companies.

Management and hourly employees are encouraged to get involved with school and community groups. On a recent rainy January morning, Ed Krystek, manager of systems at Campbell, attended a meeting of local school principals and department heads who were deciding how to solve problems with bus driver scheduling. Krystek maintained a low profile throughout the meeting, whispering only a few suggestions to Mac Forde, Scotland County High School assistant superintendent, as to how to handle conflicts that arose.

While buses may seem to be a mundane educational issue, by helping schools resolve conflicts with proven industrial techniques (such as Deming's and Taguchi's), Campbell is building a long-term relationship with the schools. During the summer, a teacher interned at the company. Returning to teach, she now has a better idea of what the corporate environment is like and how to prepare her students for it.

High school students from nearby Scotland County and Robeson County also visit the plant on career days. In addition, Campbell encourages its hourly employees to visit schools to encourage kids to complete their education.

In cooperation with the state of North Carolina, Campbell has established an apprenticeship program for its maintenance and can manufacturing mechanics. It is a four year program that costs the company $50,000 per employee annually. Currently, three maintenance workers and two packaging workers are enrolled. They work third shift so they can take classes during the day.

lament the low status of vo-tech education in the U.S. and wished that an apprenticeship system was in the U.S. (see sidebar above).

Today's average food worker has some high school education, but by the year 2000, a high school diploma or general equivalency diploma (GED) will be a minimal requirement. Currently several companies encourage or pay for the costs of earning a GED. In addition, basic skills must be improved. "We need employees who read and understand English well, handle math, solve problems and work well on a team," said Alan

FUTURE FOOD WORKERS

"You feel better about yourself having a direction and knowing where you're going," said Jody Maxson, maintenance technician, referring to Golden Grain's training/incentive program.

Miller, senior operations officer, chief administrative officer at Borden, Inc.

Campbell Soups' Maxton, NC plant has taken training and education of its present and future workforce very seriously (see sidebar on page 95). "In American industry for years past, people clocked in and left their brain at the door and we used their backs for eight to ten hours a day. And when they clocked out, they picked their brain up and left," said Fred George, vice president manufacturing of the eastern region. "Well, we're not hiring people for their backs any longer. We're hiring them for their minds." George and his staff are very active in spreading the education gospel to state legislators, other industry leaders, civic groups and businesses. "We've got to get involved in the education system, financially and personally, to generate the high tech worker of the year 2000: a quality-minded, service-minded, technically-oriented employee or we're all going to be working for overseas companies," George said.

Golden Grain employees volunteer to tutor at San Leandro's James Madison Elementary School while the company provides IBM computers and office furniture. "We can't assume our tax base money will be enough for schools to turn out the people we would like to employ. We must be active in community programs and assist the schools," said Golden Grain's Jim McConnaughay.

In addition to boosting education in the basics, some companies must face the additional challenge of dealing with illiteracy or foreign-speaking employees. Using pictographs to design around illiteracy was offered as a temporary solution by Arthur D. Little's Bill Morgan. Most of the companies *FE* interviewed feel these employees are valuable and want to contribute to the company, so the companies make training opportunities available. "English as a Second Language" and reading classes are given at many of the interviewed companies' facilities and employees attend on a volunteer basis on their own time.

Seven percent of the 300 people

Sisters, Parents, unite!

While food plant production areas are rich in diversity in terms of Hispanics, blacks, whites, Asians and Indians, management remains very much white and male. Interestingly enough, most food companies' workforce is 60 to 70 percent female. Yet, while providing excellent health benefits and showing great concern for workers, most major food companies have no provision for day-care—traditionally considered a 'female problem.'

However, as the generation of the two-income family makes inroads into boardrooms across America, day-care for children and elderly parents will be addressed, according to Bill Morgan, senior consultant at A.D. Little, Boston, MA.

Future day-care may result from a cooperative arrangement between several companies rather than being the exclusive response of one company, said Jerry York, factory manager at Ore-Ida Foods, Inc.'s West Chester, PA plant.

However, the future has arrived at Hatfield Meat Co. in Lansdale, PA. "We've had day-care since 1985," said Steve Moyer of human resources. Day-care was instituted after Hatfield's president strolled through the plant and heard many people voice concern about how they had trouble finding child care.

So, Hatfield converted a house it owned across from the plant into a licensed educational day-care facility that employs eight full-time teachers. The company pays competitive wages to minimize the traditional 100 percent turnover that plagues minimal wage day-care workers. Sixty-five children attend along with five latchkey children who are dropped off after school.

The company subsidizes the facility up to $50,000 per year with parents paying the balance—ranging from $70 to $100 per week. In response to critics who ask why employees without children would want their company subsidizing day-care, Moyer said no one has complained.

Day-care is really no longer a 'female problem' since single parents of both sexes and dual income earners share the same worries about arranging childcare. "Arranging childcare has always been a stress-producing situation for parents," said Moyer. "And onsite day-care relieves much of that stress," he added.

"People are very enthusiastic about the program," said Parmjit Khaira, a trainer in Golden Grain's training program.

employed at Ore-Ida Foods, Inc.'s West Chester, PA plant participate in voluntary state-funded "English as a Second Language/Adult Basic Education" classes, according to Jerry York, factory manager. GED assistance and literacy training are also provided. The factory uses rainbow-colored temperature charts since they are more easily understood than traditional SPC charts.

Borden's Alan Miller has been very pleased with the participation in English classes. Many of the Vietnamese and Cambodians study English on their own time and have made amazing progress, he said.

The future is here

Tomorrow's and in some cases, this afternoon's workers are also being challenged to adapt to an entirely new philosophy: one that asks them what they think. Workers are joining teams at Pillsbury. Currently the team concept is in its infancy "and transition has been difficult, but it's been working," said Mike Broll. For example, there is the quality assurance team which as a group decides whether a product is acceptable. Employees must be trained to interact in these group decision-making settings. They are given the techniques to make decisions as a group and how to evaluate performance. There are 30 teams in Murphysboro comprising ten to 20 members. Each team interviews from a pool to hire or replace members.

"Line workers and all employees are being trained in communication skills, both verbal and written," said

A skinny pig is good news

Labor is a four letter word at Quaker Oats Co.'s Golden Grain facility in Seattle, WA because production and warehouse employees are part of the same team. Management sees itself as a coach, said Vicki Rosellini of human resources, after she corrected *FE* from using the "L" word to refer to hourly employees as labor.

Golden Grain has a unique three-part compensation program in place as of February 1, 1991, in which employees may volunteer to participate. Approximately 65 out of 86 employees are engaged in the *Pay for Knowledge* training program which rewards individual initiative and gains in skill. Twenty-four percent of the participants have been promoted to higher paying positions as a result of the program.

Pay for Knowledge includes on-the-job training (OJT), outside classroom time, testing and certification (where applicable). Jody Maxson is a maintenance technician who recently completed his associates degree in electricity under the program. He is presently at Level 3 (out of four levels) and is working towards his boilers' license. "As an employee, you feel better about yourself having a direction and knowing where you're going," Maxson said. Overall, he is satisfied with Pay for Knowledge, but he expressed impatience with the additional time the advanced stages of the program demand. Earlier, he had only to demonstrate proficiency, but at this point he must go to school. However, he acknowledges education is critical to his professional growth.

"People are very enthusiastic about the program," said Parmjit Khaira, a 13 year veteran of the processing department, who is now a trainer.

Share the Success is the second part of the compensation program and it rewards group efforts to save money. "It makes us aware of waste and encourages us to cut down on it," said Khaira. Each month a particular area is chosen and a goal is established, for instance a goal could be established to cut down on flour waste. Twice a year, employees share in the profits if goals are met, with rewards reaching $1000.

What happens if the goal is not realized? Rather than show disappointment, Rosellini said, "People just committed themselves to not letting it happen again." Maxson agreed, adding, "No one comes down on you. We take the good with the bad."

Visual aids keep employees abreast of their collective efforts toward eliminating waste. "No one really reads the multitude of charts and graphs in company literature," said Rosellini, "so we keep it simple with pictures which represent company progress. A fat pig means we're wasting a lot." And a skinny pig is good news.

The third part of the program builds corporate awareness. The *Operating Income Multiplier* rewards employees if corporate performance beats the goal.

All three programs have boosted morale tremendously and opened up avenues of communication, according to all three Golden Grain employees. Rosellini added that the program is an ongoing process that must continually be nurtured.

Golden Grain's Jim McConnaughay. "Line workers are being trained to make presentations, interact, persuade, represent their group, influence others, and articulate themselves. For many, this is the first time they've done anything like this. People are being trained to be cross-functional: not just in processing, but in processing and packaging. Skill sets are being expanded."

The team concept has bloomed beautifully at Campbell's Maxton, NC plant which makes its cans as well as fills them with soup. Implementation of a worker safety program in the can manufacturing department reduced injuries and employee turnover, and improved morale, said Daryl Clayton, container manager. By giving employees more responsibility plus the tools and training to do the job, a dramatic turnaround occurred. Employee turnover dropped to three percent and injuries dropped 55 percent, Clayton said.

As part of the program, line workers made presentations on 200 safety topics and learned how to use safety equipment, (such as earplugs, fire extinguishers). They have also been cross-trained on other types of canning equipment.

Like other Campbell employees, Maxton employees can volunteer to be on a quality circle that chooses problems to solve; or be assigned to a task force that disbands after solving a management-assigned problem; or be a member of the still experimental team concept. The eventual goal of the teams is to be self-directed.

Stress of change

Once employees become more involved in their jobs, they generally like it. However, the transition itself can be stressful. The old idea that the supervisor solves all the problems is comforting and difficult to surrender. Workers can be stressed by the authority given them to shut off a line and they worry whether they can succeed at new tasks, said McConnaughay. Sometimes, workers set in traditional worker-management roles resist change. In these cases, peer pressure can encourage the old timers to change. Occasionally, a stubborn worker will either wait for retirement or become obsolete.

Open communication can reduce much of the stress, according to McConnaughay. Many managers interviewed by *FE* said it is imperative to involve employees at the very beginning of changes to give them an element of control. If they are in on the process from the beginning, employees will have a sense of ownership in a new program. Successful managers know that taking the time to communicate with employees will facilitate the success of a new program. Oreida's Jerry York welcomes employee questioning of management, saying, "it shows that they care." Although there are some old school managers that still expect employees to check their brain at the door, they are very much in a diminishing minority. Companies interested in implementing these changes in management will realize success by remembering as York simply said, that "people like to be in on what's going on." ▲

Characteristics of Today's and Tomorrow's Workplace

Traditional Model	High Performance Model
Strategy	
Mass production	Flexible production
Centralized control	Decentralized control
Production	
End of line quality control	On-line quality assurance
Fragmented tasks	Work teams, multi-skilled workers
Authority vested in supervisor	Authority delegated to worker
Hiring	
Labor-management confrontation	Labor-management cooperation
Minimal qualifications accepted	Screening for basic skills
Workers seen as a cost	Workforce seen as investment
Job Ladders	
Internal labor market	Limited internal labor market
Advancement by seniority	Advancement by certified skills
Training	
Minimal for line workers	Training for everyone
Specialized for craft workers	Broader skills sought

Source: "Competing in the New International Economy." Washington: Office of Technology Assessment, 1990.

Numbers of Food Workers in the U.S. (1987)

Dehydrated fruit, vegetable, soup
10,100 employees
132 plants
$11.9 billion in shipments

Canned foods
65,100 employees
647 plants
$12.2 billion in shipments

Frozen foods
49,800 employees
258 plants
$6.6 billion in shipments

Pickles, sauces, salad dressing
21,400 employees
382 plants
$5.5 billion in shipments

Total:
146,400 workers
1,419 plants
$36.2 billion in shipments

Source: 1987 Census of Manufacturers, Bureau of the Census.